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> #Source term Q for the 2D Euler equations -
> # Energy e
>
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$$
\begin{aligned}
> \; Q := & \frac{1}{2}\left(rho\_x\cos\left(\frac{a\_rhox\,\pi\,x}{L}\right)a\_rhox\,\pi\left(u\_0+u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\right.\right. \\
& \left.\left.+u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\right)\right)\left(2\,p\_x\cos\left(\frac{a\_px\,\pi\,x}{L}\right)+2\,p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)+2\,p\_0\right. \\
& -u\_0^2\,rho\_0-v\_0^2\,rho\_0-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_0 \\
& -2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_0+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0 \\
& +u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0+u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) \\
& +u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) \\
& -u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) \\
& -u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) \\
& -u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) \\
& -u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) \\
& -2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0 \\
& +\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_0+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_0 \\
& -v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) \\
& -v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) \\
& -v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) \\
& -v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) \\
& +\gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+\gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) \\
& +u\_0^2\,\gamma\,rho\_0-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_0-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_0
\end{aligned}
$$

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\begin{aligned}
&- u\_0^2\ rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) - u\_0^2\ rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&- v\_x^2 \cos\left(\frac{a\_vx \pi x}{L}\right)^2 rho\_0 - v\_y^2 \sin\left(\frac{a\_vy \pi y}{L}\right)^2 rho\_0 + \gamma\, v\_0^2\ rho\_0 \\
&- v\_0^2\ rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) - v\_0^2\ rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&+ 2\ u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&+ 2\ u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&+ 2\ \gamma\, v\_x \cos\left(\frac{a\_vx \pi x}{L}\right) v\_y \sin\left(\frac{a\_vy \pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&+ 2\ \gamma\, v\_x \cos\left(\frac{a\_vx \pi x}{L}\right) v\_y \sin\left(\frac{a\_vy \pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&+ 2\ u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) \gamma\, rho\_0 \\
&+ 2\ u\_0\, u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&+ 2\ u\_0\, u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&+ 2\ u\_0\, u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&+ 2\ u\_0\, u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&- 2\ u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&- 2\ u\_x \sin\left(\frac{a\_ux \pi x}{L}\right) u\_y \cos\left(\frac{a\_uy \pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&- 2\ v\_x \cos\left(\frac{a\_vx \pi x}{L}\right) v\_y \sin\left(\frac{a\_vy \pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&- 2\ v\_x \cos\left(\frac{a\_vx \pi x}{L}\right) v\_y \sin\left(\frac{a\_vy \pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&+ 2\ \gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx \pi x}{L}\right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&+ 2\ \gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx \pi x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right) \\
&+ 2\ \gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy \pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L}\right) \\
&+ 2\ \gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy \pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy \pi y}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_0+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_0\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_0\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0
\end{aligned}
$$

$$+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_0+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\Bigg)\Bigg)\Bigg/$$
$$\left(L\,(\gamma-1)\,\left(rho\_0+rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right)\right)$$
$$+\frac{1}{2}\,\frac{1}{L\,(\gamma-1)}\left(u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)\,a\_ux\,\pi\left(2\,p\_x\cos\left(\frac{a\_px\,\pi\,x}{L}\right)\right.\right.$$
$$+2\,p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)+2\,p\_0-u\_0^2\,rho\_0-v\_0^2\,rho\_0$$
$$-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_0-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0$$
$$+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0$$
$$+u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_0-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0$$
$$+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_0+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_0$$
$$-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$-v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$+\gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+\gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$+u\_0^2\,\gamma\,rho\_0-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,rho\_0-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\,rho\_0$$
$$-u\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)-u\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$
\begin{aligned}
&- v\_x^2 \cos\left(\frac{a\_vx\pi x}{L}\right)^2 rho\_0 - v\_y^2 \sin\left(\frac{a\_vy\pi y}{L}\right)^2 rho\_0 + \gamma v\_0^2 rho\_0 \\
&- v\_0^2 rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) - v\_0^2 rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) \gamma rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&+ 2\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) \gamma rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, \gamma v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&+ 2\, \gamma v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) \gamma rho\_0 \\
&+ 2\, u\_0\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) \gamma rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&+ 2\, u\_0\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) \gamma rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, u\_0\, u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) \gamma rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&+ 2\, u\_0\, u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) \gamma rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&- 2\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&- 2\, u\_x \sin\left(\frac{a\_ux\pi x}{L}\right) u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&- 2\, v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&- 2\, v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, \gamma v\_0\, v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&+ 2\, \gamma v\_0\, v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, \gamma v\_0\, v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) \\
&+ 2\, \gamma v\_0\, v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) \\
&+ 2\, \gamma v\_x \cos\left(\frac{a\_vx\pi x}{L}\right) v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_0
\end{aligned}
$$

$$
\begin{aligned}
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\pi\,x}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\pi\,x}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_0+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_0\\
&+u\_y^2\cos\left(\frac{a\_uy\pi\,y}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+u\_y^2\cos\left(\frac{a\_uy\pi\,y}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\,rho\_0\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\pi\,x}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\pi\,x}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\pi\,y}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\pi\,y}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)\,rho\_0\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)\,rho\_0+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)\,rho\_0\Bigg)\Bigg)
\end{aligned}
$$

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\begin{aligned}
&+\left(\left(u\_0+u\_x\sin\left(\frac{a\_ux\pi x}{L}\right)\right.\right.\\
&\left.\left.+u\_y\cos\left(\frac{a\_uy\pi y}{L}\right)\right)\left(\pi u\_x\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\,u\_0\,\gamma\,rho\_0^2\right.\right.\\
&-\pi u\_x\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\,u\_0\,rho\_x^2\sin\left(\frac{a\_rhox\pi x}{L}\right)^2\\
&-\pi u\_x\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\,u\_0\,rho\_y^2\cos\left(\frac{a\_rhoy\pi y}{L}\right)^2\\
&+\pi u\_x^2\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\sin\left(\frac{a\_ux\pi x}{L}\right)\gamma\,rho\_0^2\\
&-\pi u\_x^2\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\sin\left(\frac{a\_ux\pi x}{L}\right)rho\_x^2\sin\left(\frac{a\_rhox\pi x}{L}\right)^2\\
&-\pi u\_x^2\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\sin\left(\frac{a\_ux\pi x}{L}\right)rho\_y^2\cos\left(\frac{a\_rhoy\pi y}{L}\right)^2\\
&-\pi u\_x\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\pi y}{L}\right)rho\_0^2\\
&+\pi v\_x\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\,v\_0\,rho\_x^2\sin\left(\frac{a\_rhox\pi x}{L}\right)^2\\
&+\pi v\_x\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\,v\_0\,rho\_y^2\cos\left(\frac{a\_rhoy\pi y}{L}\right)^2\\
&+\pi v\_x^2\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\cos\left(\frac{a\_vx\pi x}{L}\right)rho\_x^2\sin\left(\frac{a\_rhox\pi x}{L}\right)^2\\
&+\pi v\_x^2\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\cos\left(\frac{a\_vx\pi x}{L}\right)rho\_y^2\cos\left(\frac{a\_rhoy\pi y}{L}\right)^2\\
&+\pi v\_x\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\,v\_y\sin\left(\frac{a\_vy\pi y}{L}\right)rho\_0^2\\
&-\pi v\_x\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\,\gamma\,v\_0\,rho\_0^2\\
&-\pi v\_x^2\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\,\gamma\cos\left(\frac{a\_vx\pi x}{L}\right)rho\_0^2\\
&-\pi u\_x\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\,u\_0\,rho\_0^2\\
&-\pi u\_x^2\cos\left(\frac{a\_ux\pi x}{L}\right)a\_ux\sin\left(\frac{a\_ux\pi x}{L}\right)rho\_0^2\\
&+\pi v\_x\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\,v\_0\,rho\_0^2\\
&+\pi v\_x^2\sin\left(\frac{a\_vx\pi x}{L}\right)a\_vx\cos\left(\frac{a\_vx\pi x}{L}\right)rho\_0^2\\
&-p\_x\sin\left(\frac{a\_px\pi x}{L}\right)a\_px\,\pi\,rho\_y\cos\left(\frac{a\_rhoy\pi y}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&- p\_x \sin\left(\frac{a\_px\pi x}{L}\right) a\_px\pi\, rho\_0 - rho\_x \cos\left(\frac{a\_rhox\pi x}{L}\right) a\_rhox\pi\, p\_0 \\
&- 2\pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_0\, rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) rho\_0 \\
&- 2\pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_0\, rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) rho\_0 \\
&- 2\pi u\_x^2 \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux \sin\left(\frac{a\_ux\pi x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) rho\_0 \\
&- 2\pi u\_x^2 \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux \sin\left(\frac{a\_ux\pi x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) rho\_0 \\
&+ 2\pi v\_x \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx\, v\_0\, rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) rho\_0 \\
&+ 2\pi v\_x \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx\, v\_0\, rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) rho\_0 \\
&+ 2\pi v\_x^2 \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx \cos\left(\frac{a\_vx\pi x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\pi x}{L}\right) rho\_0 \\
&+ 2\pi v\_x^2 \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx \cos\left(\frac{a\_vx\pi x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\pi y}{L}\right) rho\_0 \\
&+ \pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_0\, \gamma\, rho\_x^2 \sin\left(\frac{a\_rhox\pi x}{L}\right)^2 \\
&+ \pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_0\, \gamma\, rho\_y^2 \cos\left(\frac{a\_rhoy\pi y}{L}\right)^2 \\
&+ \pi u\_x^2 \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux \sin\left(\frac{a\_ux\pi x}{L}\right) \gamma\, rho\_x^2 \sin\left(\frac{a\_rhox\pi x}{L}\right)^2 \\
&+ \pi u\_x^2 \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux \sin\left(\frac{a\_ux\pi x}{L}\right) \gamma\, rho\_y^2 \cos\left(\frac{a\_rhoy\pi y}{L}\right)^2 \\
&+ \pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) \gamma\, rho\_0^2 \\
&- \pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\pi x}{L}\right)^2 \\
&- \pi u\_x \cos\left(\frac{a\_ux\pi x}{L}\right) a\_ux\, u\_y \cos\left(\frac{a\_uy\pi y}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\pi y}{L}\right)^2 \\
&+ \pi v\_x \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx\, v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\pi x}{L}\right)^2 \\
&+ \pi v\_x \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx\, v\_y \sin\left(\frac{a\_vy\pi y}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\pi y}{L}\right)^2 \\
&- \pi v\_x \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx\, \gamma\, v\_0\, rho\_x^2 \sin\left(\frac{a\_rhox\pi x}{L}\right)^2 \\
&- \pi v\_x \sin\left(\frac{a\_vx\pi x}{L}\right) a\_vx\, \gamma\, v\_0\, rho\_y^2 \cos\left(\frac{a\_rhoy\pi y}{L}\right)^2
\end{aligned}
$$

$$-\pi\, v\_x^2 \sin\left(\frac{a\_vx\,\pi\, x}{L}\right) a\_vx\,\gamma \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2$$

$$-\pi\, v\_x^2 \sin\left(\frac{a\_vx\,\pi\, x}{L}\right) a\_vx\,\gamma \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2$$

$$-\pi\, v\_x \sin\left(\frac{a\_vx\,\pi\, x}{L}\right) a\_vx\,\gamma\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0^2$$

$$+2\,\pi\, u\_x \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux\, u\_0\,\gamma\, rho\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)$$

$$+2\,\pi\, u\_x \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux\, u\_0\,\gamma\, rho\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)$$

$$-2\,\pi\, u\_x \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux\, u\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_y \cos(1$$

$$/(L)(a\_rhoy\,\pi\, y))$$

$$+2\,\pi\, u\_x^2 \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) \gamma\, rho\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)$$

$$+2\,\pi\, u\_x^2 \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) \gamma\, rho\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)$$

$$-2\,\pi\, u\_x^2 \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_y$$

$$\cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)$$

$$-2\,\pi\, u\_x \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux\, u\_y \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_0\, rho\_x \sin(1/$$

$$(L)(a\_rhox\,\pi\, x))$$

$$-2\,\pi\, u\_x \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux\, u\_y \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_0\, rho\_y \cos(1/$$

$$(L)(a\_rhoy\,\pi\, y))$$

$$+2\,\pi\, v\_x \sin\left(\frac{a\_vx\,\pi\, x}{L}\right) a\_vx\, v\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_y \cos(1$$

$$/(L)(a\_rhoy\,\pi\, y))$$

$$+2\,\pi\, v\_x^2 \sin\left(\frac{a\_vx\,\pi\, x}{L}\right) a\_vx \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_y$$

$$\cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)$$

$$+2\,\pi\, v\_x \sin\left(\frac{a\_vx\,\pi\, x}{L}\right) a\_vx\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0\, rho\_x \sin(1/$$

$$(L)\,(a\_rhox\,\pi\,x))$$

$$+2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\,rho\_y\cos(1/$$

$$(L)\,(a\_rhoy\,\pi\,y))$$

$$-2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_0\,rho\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$

$$-2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_0\,rho\_0\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$-2\,\pi\,v\_x^2\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$

$$-2\,\pi\,v\_x^2\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$+2\,\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_0\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$

$$\cos\left(1/(L)\,(a\_rhoy\,\pi\,y)\right)$$

$$+2\,\pi\,u\_x^2\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$

$$\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$+2\,\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_0\,rho\_x\sin(1$$

$$/\,(L)\,(a\_rhox\,\pi\,x))$$

$$+2\,\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_0\,rho\_y\cos(1$$

$$/\,(L)\,(a\_rhoy\,\pi\,y))$$

$$-2\,\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$

$$rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$+2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$

$$rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$-2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$

$$\cos\left(1/(L)(a\_rhoy\,\pi\,y)\right)$$
$$-2\,\pi\,v\_x^2\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$
$$\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\,rho\_x\sin(1/$$
$$(L)(a\_rhox\,\pi\,x))$$
$$-2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\,rho\_y\cos(1/$$
$$(L)(a\_rhoy\,\pi\,y))$$
$$+\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_x^2\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)^2$$
$$+2\,\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$+\pi\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)a\_ux\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_y^2\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)^2$$
$$-\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_x^2\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)^2$$
$$-2\,\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-\pi\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)a\_vx\,\gamma\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_y^2\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)^2$$
$$-p\_x\sin\left(\frac{a\_px\,\pi\,x}{L}\right)a\_px\,\pi\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$-rho\_x\cos\left(\frac{a\_rhox\,\pi\,x}{L}\right)a\_rhox\,\pi\,p\_x\cos\left(\frac{a\_px\,\pi\,x}{L}\right)$$
$$-rho\_x\cos\left(\frac{a\_rhox\,\pi\,x}{L}\right)a\_rhox\,\pi\,p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)\Bigg)\Bigg)\Bigg/\Bigg((\gamma$$
$$-1)\,L\left(rho\_0+rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right)\Bigg)$$
$$-\frac{1}{2}\left(rho\_y\sin\left(\frac{a\_rhoy\,\pi\,y}{L}\right)a\_rhoy\,\pi\left(v\_0+v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\right.\right.$$

$$+ v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\Bigg)\left(2\,p\_x\cos\left(\frac{a\_px\,\pi\,x}{L}\right)+2\,p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)+2\,p\_0\right.$$
$$- u\_0^2\,rho\_0 - v\_0^2\,rho\_0 - 2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_0$$
$$- 2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_0 + u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0$$
$$+ u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0 + u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$- u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$- u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$- u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$- u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$- 2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0 - 2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0$$
$$+ \gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_0 + \gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_0$$
$$- v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$- v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$- v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$- v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$+ \gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) + \gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$+ u\_0^2\,\gamma\,rho\_0 - u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_0 - u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_0$$
$$- u\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) - u\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$- v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_0 - v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_0 + \gamma\,v\_0^2\,rho\_0$$
$$- v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) - v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$
\begin{aligned}
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_0\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_0\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_0+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_0\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_0+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\Bigg)\Bigg/\\
&\left(L\,(\gamma-1)\,\left(rho\_0+rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right)\right)\\
&+\frac{1}{2}\,\frac{1}{L\,(\gamma-1)}\left(v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)\,a\_vy\,\pi\left(2\,p\_x\cos\left(\frac{a\_px\,\pi\,x}{L}\right)\right.\right.
\end{aligned}
$$

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\begin{aligned}
&+2\,p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)+2\,p\_0-u\_0^2\,rho\_0-v\_0^2\,rho\_0\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_0-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_0\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0\\
&+u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_0+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_0\\
&-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+\gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_0^2\,\gamma\,rho\_0-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_0-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_0\\
&-u\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)-u\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_0-v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_0+\gamma\,v\_0^2\,rho\_0\\
&-v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)-v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_0\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\pi\,y}{L}\right)rho\_0\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_0+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_0\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\\
&+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_0+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\Bigg)\Bigg)\\
&+\left(\left(v\_0+v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)+v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\right)\left(\right.\right.\\
&-\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)\,a\_uy\,u\_0\,\gamma\,rho\_0^2\\
&+\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)\,a\_uy\,u\_0\,rho\_x^2\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)^2
\end{aligned}
$$

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\begin{aligned}
&+\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&+\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_x \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) rho\_0^2 \\
&-\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) \gamma\, rho\_0^2 \\
&+\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&+\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&-\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_0\, rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&-\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_0\, rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&-\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_0^2 \\
&-\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&-\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&+\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma\, v\_0\, rho\_0^2 \\
&+\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0^2 \\
&+p\_y \cos\left(\frac{a\_py\,\pi\, y}{L}\right) a\_py\,\pi\, rho\_0 + \pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, rho\_0^2 \\
&+\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_0^2 \\
&-\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_0\, rho\_0^2 \\
&-\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0^2 \\
&-\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, \gamma\, rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&-\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, \gamma\, rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&-\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_x \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) \gamma\, rho\_0^2 \\
&+\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_x \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
&+\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_x \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&-\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) \gamma\, rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&-\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) \gamma\, rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&-\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&-\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&+\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma\, v\_0\, rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&+\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma\, v\_0\, rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&+\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_0^2 \\
&+\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x^2 \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)^2 \\
&+\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, \gamma \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y^2 \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)^2 \\
&+2\,\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_0 \\
&+2\,\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) rho\_0 \\
&+2\,\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_0 \\
&+2\,\pi\, u\_y^2 \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) rho\_0 \\
&-2\,\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_0 \\
&-2\,\pi\, v\_y \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy\, v\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) rho\_0 \\
&-2\,\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_0 \\
&-2\,\pi\, v\_y^2 \cos\left(\frac{a\_vy\,\pi\, y}{L}\right) a\_vy \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) rho\_0 \\
&-2\,\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_0 \\
&-2\,\pi\, u\_y \sin\left(\frac{a\_uy\,\pi\, y}{L}\right) a\_uy\, u\_0\, \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) rho\_y
\end{aligned}
$$

$$\cos\left(\frac{1}{(L)(a\_rhoy\,\pi\,y)}\right)$$

$$-2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_0\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)rho\_0$$

$$-2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_0\,rho\_x\sin(1/(L)(a\_rhox\,\pi\,x))$$

$$-2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_0\,rho\_y\cos(1/(L)(a\_rhoy\,\pi\,y))$$

$$+2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_0$$

$$+2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$+2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)rho\_0$$

$$-2\,\pi\,u\_y^2\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_0$$

$$-2\,\pi\,u\_y^2\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$

$$-2\,\pi\,u\_y^2\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)rho\_0$$

$$-2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_0$$

$$-2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$rho\_0+2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\,v\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_0$$
$$+2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\,v\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$
$$\cos\left(1\Big/(L)(a\_rhoy\,\pi\,y)\right)$$
$$+2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\,v\_0\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)rho\_0$$
$$+2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0\,rho\_x\sin(1/$$
$$(L)(a\_rhox\,\pi\,x))$$
$$+2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0\,rho\_y\cos(1$$
$$/(L)(a\_rhoy\,\pi\,y))$$
$$+2\,\pi\,v\_y^2\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_0$$
$$+2\,\pi\,v\_y^2\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$
$$\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$+2\,\pi\,v\_y^2\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,\gamma\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)rho\_0$$
$$+2\,\pi\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\,u\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y\cos(1$$
$$/(L)(a\_rhoy\,\pi\,y))$$
$$+2\,\pi\,u\_y^2\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)a\_uy\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y$$
$$\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)$$
$$-2\,\pi\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)a\_vy\,v\_0\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)rho\_y\cos(1$$

$$
\begin{aligned}
&/ (L) (a\_rhoy \pi y)) \\
&- 2 \pi v\_y^2 \cos\left(\frac{a\_vy \pi y}{L} \right) a\_vy \sin\left(\frac{a\_vy \pi y}{L} \right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L} \right) rho\_y \\
&\cos\left(\frac{a\_rhoy \pi y}{L} \right) \\
&- \pi u\_y \sin\left(\frac{a\_uy \pi y}{L} \right) a\_uy u\_x \sin\left(\frac{a\_ux \pi x}{L} \right) \gamma rho\_x^2 \sin\left(\frac{a\_rhox \pi x}{L} \right)^2 \\
&- 2 \pi u\_y \sin\left(\frac{a\_uy \pi y}{L} \right) a\_uy u\_x \sin\left(\frac{a\_ux \pi x}{L} \right) \gamma rho\_x \sin\left(\frac{a\_rhox \pi x}{L} \right) \\
&rho\_y \cos\left(\frac{a\_rhoy \pi y}{L} \right) \\
&- \pi u\_y \sin\left(\frac{a\_uy \pi y}{L} \right) a\_uy u\_x \sin\left(\frac{a\_ux \pi x}{L} \right) \gamma rho\_y^2 \cos\left(\frac{a\_rhoy \pi y}{L} \right)^2 \\
&+ \pi v\_y \cos\left(\frac{a\_vy \pi y}{L} \right) a\_vy \gamma v\_x \cos\left(\frac{a\_vx \pi x}{L} \right) rho\_x^2 \sin\left(\frac{a\_rhox \pi x}{L} \right)^2 \\
&+ 2 \pi v\_y \cos\left(\frac{a\_vy \pi y}{L} \right) a\_vy \gamma v\_x \cos\left(\frac{a\_vx \pi x}{L} \right) rho\_x \sin\left(\frac{a\_rhox \pi x}{L} \right) \\
&rho\_y \cos\left(\frac{a\_rhoy \pi y}{L} \right) \\
&+ \pi v\_y \cos\left(\frac{a\_vy \pi y}{L} \right) a\_vy \gamma v\_x \cos\left(\frac{a\_vx \pi x}{L} \right) rho\_y^2 \cos\left(\frac{a\_rhoy \pi y}{L} \right)^2 \\
&+ p\_y \cos\left(\frac{a\_py \pi y}{L} \right) a\_py \pi rho\_x \sin\left(\frac{a\_rhox \pi x}{L} \right) \\
&+ p\_y \cos\left(\frac{a\_py \pi y}{L} \right) a\_py \pi rho\_y \cos\left(\frac{a\_rhoy \pi y}{L} \right) \\
&+ rho\_y \sin\left(\frac{a\_rhoy \pi y}{L} \right) a\_rhoy \pi p\_x \cos\left(\frac{a\_px \pi x}{L} \right) \\
&+ rho\_y \sin\left(\frac{a\_rhoy \pi y}{L} \right) a\_rhoy \pi p\_y \sin\left(\frac{a\_py \pi y}{L} \right) \\
&+ rho\_y \sin\left(\frac{a\_rhoy \pi y}{L} \right) a\_rhoy \pi p\_0 \Bigg) \Bigg) \Bigg/ \left((\gamma - 1) L \left(rho\_0 \right.\right. \\
&\left.\left. + rho\_x \sin\left(\frac{a\_rhox \pi x}{L} \right) + rho\_y \cos\left(\frac{a\_rhoy \pi y}{L} \right) \right) \right) + \frac{1}{L} \left(\pi \left(p\_0 \right.\right. \\
&\left.\left. + p\_x \cos\left(\frac{a\_px \pi x}{L} \right) + p\_y \sin\left(\frac{a\_py \pi y}{L} \right) \right) \left(v\_y \cos\left(\frac{a\_vy \pi y}{L} \right) a\_vy \right.\right. \\
&\left.\left. + u\_x \cos\left(\frac{a\_ux \pi x}{L} \right) a\_ux \right) \right) \\
&+ \frac{1}{L} \left(p\_y \cos\left(\frac{a\_py \pi y}{L} \right) a\_py \pi \left(v\_0 + v\_x \cos\left(\frac{a\_vx \pi x}{L} \right) \right. \right.
\end{aligned}
$$

$$+ v\_y \sin\left(\frac{a\_vy \pi y}{L} \right) \Bigg) \Bigg)$$

$$- \frac{1}{L} \left(p\_x \sin\left(\frac{a\_px \pi x}{L} \right) a\_px \pi \left(u\_0 + u\_x \sin\left(\frac{a\_ux \pi x}{L} \right) \right.\right.$$

$$\left.\left. + u\_y \cos\left(\frac{a\_uy \pi y}{L} \right) \right) \right) :$$

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